In-Space Remote Sensing: Overview of the Revolutionary Aerospace Systems and Concepts (RASC) Program

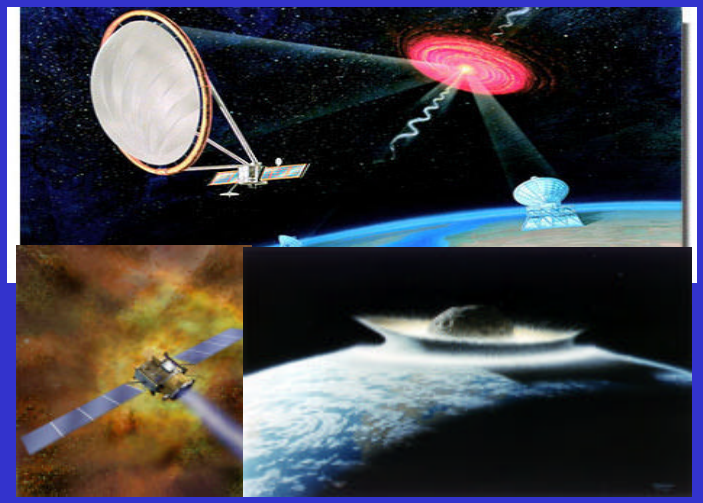
Warren Wiscombe
Code 913
NASA Goddard Space Flight Center

Meeting Agenda

8:30–8:45 Introduction (Wiscombe)
8:45–9:00 Plan for the RASC study and workshop (Heun)
9:00–9:40 Overview of stratospheric platforms (Nock)
9:40–10:00 Break
10:00–10:30 Instructions for breakout sessions (Pankine)
10:30–12:00 Begin breakout sessions (all)
12:00–13:00 Lunch
13:00–14:30 Finish breakout sessions (all)
14:30–15:30 Prepare breakout session reports (all)
15:30–15:45 Break
15:45–17:00 Breakout session reports (Heun, moderator)

Primary Objective

to develop revolutionary aerospace systems concepts for in-space remote sensing



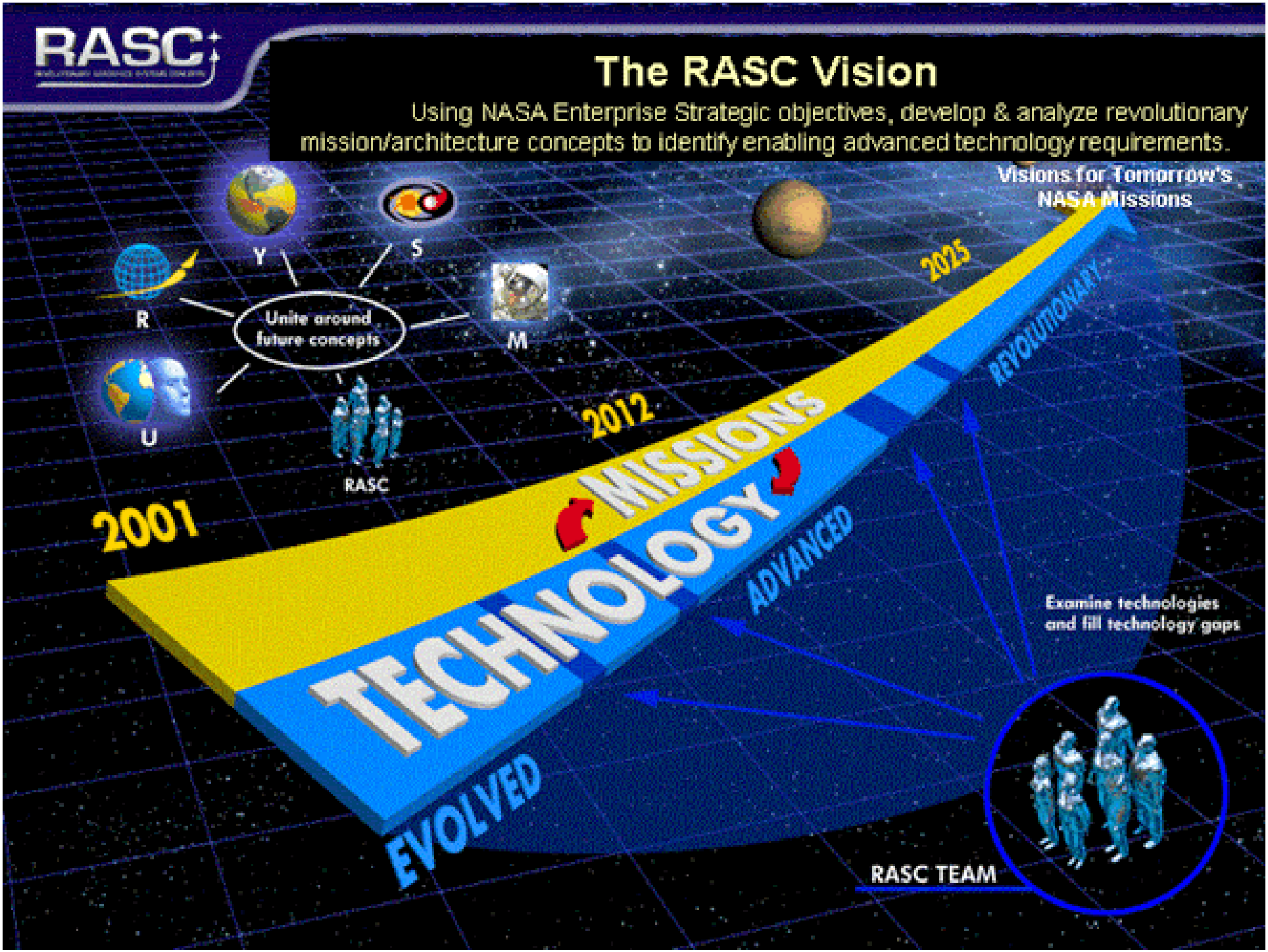
Overarching Mission

- **The *overarching mission* is to use the revolutionary aerospace mission architectures and systems concepts as the foundation for identification of common technology and infrastructure requirements for in-space remote sensing**

- **Common technology areas exist between the current set of mission studies. Key technology areas will be assessed through additional focused assessments (when resources are available):**

  - Formation flying
  - Inter-vehicle communications
  - Metrology
  - Autonomous operations

- **Infrastructure requirements will be fed to the other RASC groups to provide input to their concept definitions as well as to leverage their analysis results**


RASC
The RASC Vision
Using NASA Enterprise Strategic objectives, develop & analyze revolutionary mission/architecture concepts to identify enabling advanced technology requirements.
Visions for Tomorrow's NASA Missions
Y
S
R
M
U
Unite around future concepts
RASC
2001
2012
2025
MISSIONS
TECHNOLOGY
EVOLVED
ADVANCED
REVOLUTIONARY
Examine technologies and fill technology gaps
RASC TEAM

RASC Objectives

- Enable future NASA missions by developing
  - aerospace systems concepts
  - technology requirements
- Apply a "top-down" perspective to explore new mission capabilities and discover "What's possible"
- Maximize the benefits of revolutionary capabilities that span across NASA Enterprises
- Initial focus: identifying and evaluating revolutionary systems concepts

RASC "Top-Down" Methodology

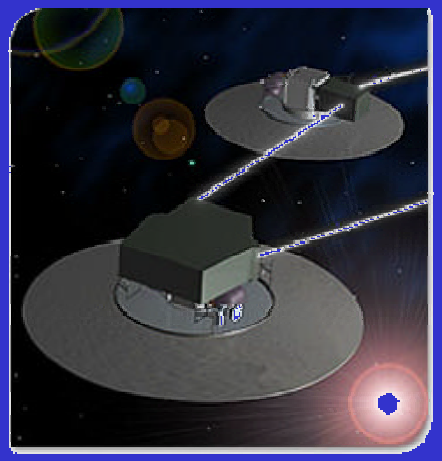
- Using a 25-year vision perspective, identify the desired new capabilities derived from NASA Enterprise objectives/priorities
- Define integrated systems approaches (architectures) and their required functional capabilities or engineering challenges
- Develop revolutionary systems concepts to provide these capabilities
- Conduct systems trade studies to define the enabling technology requirements and levels of performance needed to meet the challenges
- Recommend the most promising revolutionary concepts with their integrated system payoffs and key enabling technology requirements

Study Missions

The *study missions* currently include Earth observation, space exploration, and comet and asteroid detection and protection systems/architectures

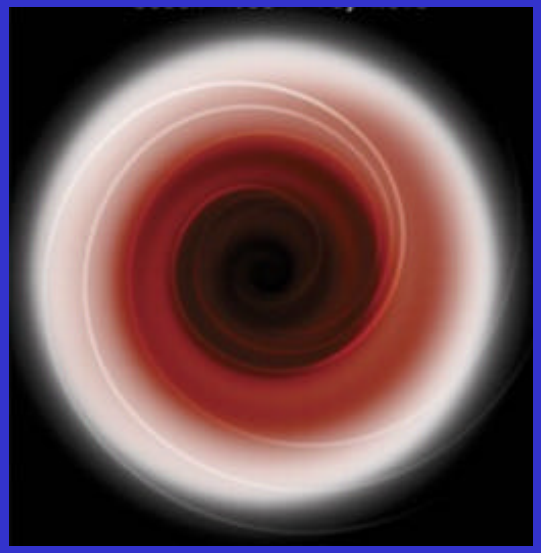
Space Based Imaging Interferometry

- David Leisawitz, GSFC
- Michaelson and Fizeau interferometers installed on booms, tethers, and free flyers will be assessed to meet Code S and Code M key science objectives



Fresnel Lens System for Gamma Ray Astronomy: Micro-arcsecond Imaging of Black Hole Event Horizons

- Neil Gehrels, GSFC
- Assessment of a mission concept that includes a Fresnel lens on one spacecraft and a gamma-ray detector on a second spacecraft 10M km away



Study of Revolutionary Earth Sciences Architecture for Atmospheric Chemistry, Earth Radiation Balance, and Geomagnetism Measurements

- Dr. Warren Wiscombe, GSFC
- A range of advanced platforms required for making Earth science measurements in the upper stratosphere will be investigated
- The revolutionary technologies necessary for each platform needed to make the desired measurements will be identified

Comet and Asteroid Protection System (CAPS)

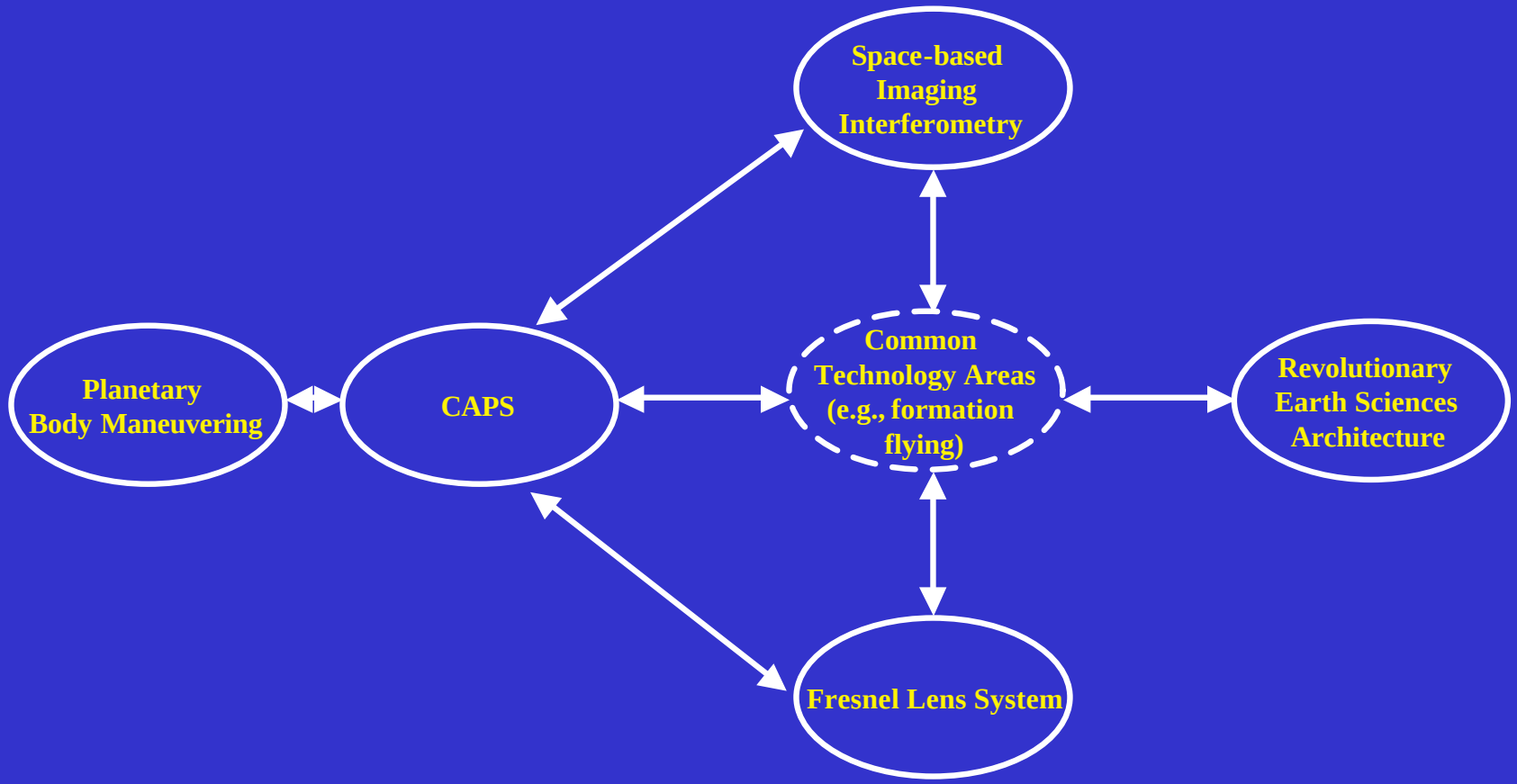
- Dan Mazanek, LaRC

- Preliminary definition of CAPS detection concepts, Near-Earth Objects (NEO) orbit modifications, and an overall architectural concept for CAPS implementation

Planetary Body Maneuvering

- Dr. George Schmidt, MSFC
- Objective: examine simple, medium, and advanced techniques for moving small planetary bodies

Relationships Between Study Missions



Each of the five planned Group 4 study missions will be stand-alone activities; however, results of several studies will feed other Group 4 studies as well as assessments of common technologies

Summary

- **Technologies and infrastructure for conducting revolutionary in-space remote sensing will be investigated**
- **The study missions currently include Earth observation, space exploration, and comet and asteroid detection and protection**
- **Key technology areas will be assessed through additional focused assessments (when resources are available):**
  - Formation flying
  - Inter-vehicle communications
  - Metrology
  - Autonomous operations
- **Infrastructure requirements will be input to other RASC groups and the associated results will be leverage**